NASA Glenn Success Stories

Sylramic™-iBN Silicon Carbide (SiC) Fiber

ATK COI Ceramics & USAF

TECHNOLOGY

Sylramic™-iBN fiber is a new type of small-diameter (10 µm) SiC fiber that was initially developed by NASA by special treatment of the commercial Sylramic™ fiber. Like its precursor fiber, it is strong (>3 GPa), dense, oxygen-free, and nearly stoichiometric. But unlike the Sylramic™ fiber, it contains reduced boron for enhanced creep-rupture resistance and thermal capability, and a thin in-situ grown boron nitride (BN) surface coating for enhanced environmental durability.

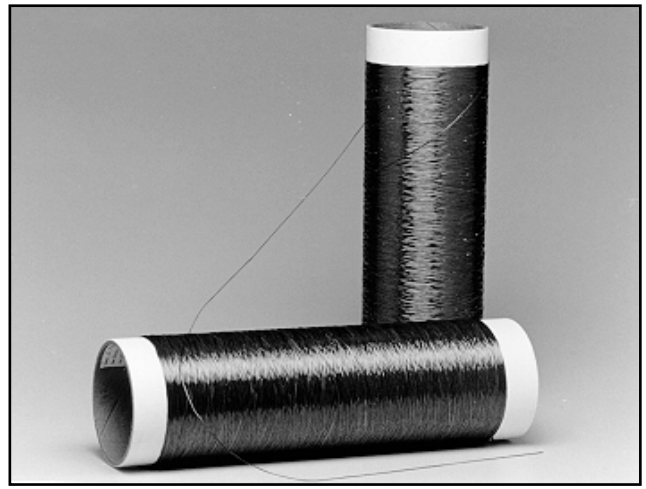
COMMERCIAL APPLICATION

Sylramic™-iBN fiber can be used in a variety of composite applications, but currently has greatest advantage as reinforcement for state-of-the-art SiC/SiC ceramic matrix composites (CMC) that are targeted for long-term structural applications at temperatures much higher than the capability of metallic superalloys.

Today, ATK COI Ceramics is commercially producing Sylramic™ and Sylramic™-iBN fiber types in the form of multifilament (~800) continuous-length tows on spools which can then be textile formed into multiple types of complex product shapes. This was facilitated under National Aerospace Initiative funding through the Air Force Research Laboratory's Materials and Manufacturing Directorate.

SOCIAL / ECONOMIC BENEFIT

Because of its excellent properties, Sylramic™-iBN reinforced SiC/SiC composites are now being targeted for multiple high-temperature power and propulsion applications to decrease fuel consumption and detrimental emissions of NOx and CO.



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NASA APPLICATIONS

NASA Fundamental Aeronautics program as well as the DoD VAATE program have down-selected the Sylramic™-iBN fiber for on-going efforts aimed at high-performance high-temperature lightweight SiC/SiC composites for the turbine engine component development. These materials also have the potential of replacing carbon fibers in high temperature composites for space applications, thereby significantly reducing the environmental durability risk associated with the carbon fibers.

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